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CLAIMS

[Claim(s)]

[Claim 1]A gear-teeth part formed of a heat-resistant styrene system elastomer, and a dome part formed with heat-resistant rigid resin, gear teeth, wherein a housed article which becomes movable inside is provided in an inside of said dome part, it is formed when said dome part welds two dome state members, and said gear-teeth part is pinched by two dome state members -- ** .

[Claim 2]The slight gear-tooth hard according to claim 1 characterized by using polycarbonate or ABS plastics as said heat-resistant rigid resin.

[Claim 3]The slight gear-tooth hard according to claim 1, wherein step of each other which can be engaged is provided in each end of said dome state member.

[Claim 4]The slight gear-tooth hard according to claim 1 characterized by carrying out ultrasonic welding as said welding.

[Claim 5]The slight gear-tooth hard according to claim 1, wherein a designing thing is provided as said housed article and a slide plate which becomes slidable over a peripheral surface of a dome part is formed in one edge of a designing thing.

[Claim 6]The slight gear-tooth hard according to claim 5, wherein weight is formed in said slide plate.

[Claim 7]The slight gear-tooth hard according to claim 5, wherein said slide plate is formed in two edges where a designing thing counters.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention softens the itching of the gum at the time [begin] of growing of infants' gear tooth, and in order to urge dental growth, a gear tooth is related with a sake.

[0002]

[Description of the Prior Art]Generally, when beginning grows in infants' gear tooth, also with **** or what that dies, the gum puts into a mouth and wants to bite. being targeted at the infants for three to 18 months after the birth, in order to soften this itching and to urge dental growth -- gear teeth -- ** -- it is provided.

[0003]Such a slight gear-tooth hard is formed in tabular with the resin which has elasticity. the gear teeth with which animals and plants, a vehicle, etc. were designed as indicated to JP,62-82024,U -- ** -- it is provided. the gear teeth which are infants' toys by forming a dome part in the center and storing a ball etc. inside and which were made usable also as almost empty -- ** -- it is proposed.

[0004]

[Problem(s) to be Solved by the Invention]However, since the whole is formed with an identical material, the following problems have generated the slight gear-tooth hard of conventional technology.

[0005]namely, the designed gear teeth -- ** -- **** -- the whole is an identical material and the time of touching the surface by hand, since there is little unevenness, and tactile feeling in inner mouth are single to the whole -- gear teeth -- ** -- ***** -- it senses unsatisfactory. In order that a sound may not come out, it is difficult to lengthen infants' interest only in the shape compared with a certain toys of various kinds of close. For this reason, charm is scarce for infants.

[0006]the designed gear teeth -- ** -- since it is designing by changing thickness, compared with what provided the general lobe, a thin portion is made, the endurance of the portion becomes low, and generating of being torn to pieces while infants are biting can be considered. Although this is solved by increasing thickness to the whole, there is a problem which the main portions become so thick and becomes difficult to bite in this case.

[0007]the gear teeth with which the dome part was formed in the center on the other hand -- ** -- **** -- fixed hardness is needed in order to form as a dome part. When a ball contacts a dome part, also in order to generate an almost empty sound [like], hardness with a constant dome part is needed. however, such rigid resin -- gear teeth -- ** -- since the circumference of a dome part which infants put into a mouth is also formed with an identical material when it forms, it becomes high hardness and elasticity is low. therefore -- although it can be used as a pacifier -- gear teeth -- ** -- ***** -- it is too hard and unsuitable. And if it should damage while infants are putting into the mouth, there is a problem in safety, such as hurting one's gum, since it is hard.

[0008]And since a slight gear-tooth hard is what is put into inner mouth, it needs to be disinfected suitably. Sterilization by boiling which can disinfect the disinfection which a gear tooth accumulates

generally and certainly at a home is desired. However, according to the construction material, since heat resistance is low, the sterilization by boiling of the thing in which the dome part was formed is impossible. For this reason, when disinfecting, the circumference will be wiped with medicine, such as ethanol, but it is easy to become insufficient disinfecting this of details. And in the state where medicine, such as ethanol, is not thoroughly dry, the medicine will go into infants' mouth and poses a problem by the sanitary aspect and a safety aspect.

[0009]the gear teeth with which the dome part was formed -- ** -- if it becomes a small child, it will stop being able to enjoy oneself as almost empty for the suckling for about three months, since it is a ball which is stored in a dome part in conventional technology, but getting interested For this reason, duration of service will become short.

[0010]this invention is made in order to solve SUBJECT in the above-mentioned conventional technology, and it comes out. the portion in which the purpose goes into the mouth of ** -- gear teeth -- ** -- ***** -- the gear teeth which also have an element as a toy by having sufficient softness and elasticity and providing a dome part -- ** -- it is -- the gear teeth excellent in the safety aspect and the sanitary aspect -- ** -- it is providing.

[0011]

[Means for Solving the Problem]to achieve the above objects, gear teeth of the invention according to claim 1 -- ** -- ****. A gear-teeth part formed of a heat-resistant styrene system elastomer, and a dome part formed with heat-resistant rigid resin, A housed article which becomes movable inside is provided in an inside of said dome part, when said dome part welds two dome state members, it is formed, and said gear-teeth part is pinched by two dome state members.

[0012]In the invention according to claim 2, polycarbonate or ABS plastics are used as the heat-resistant rigid resin according to claim 1.

[0013]As for the invention according to claim 3, step of each other which can be engaged is provided in each end of the dome state member according to claim 1.

[0014]In the invention according to claim 4, ultrasonic welding is carried out as the welding according to claim 1.

[0015]A slide plate with which a designing thing is provided as the housed article according to claim 1, and the invention according to claim 5 becomes slidable over a peripheral surface of a dome part at one edge of a designing thing is formed.

[0016]As for the invention according to claim 6, weight is formed in the slide plate according to claim 5.

[0017]As for the invention according to claim 7, the slide plate according to claim 5 was formed in two edges where a designing thing counters.

[0018]

[Function]In both this inventions that have the above composition, since the gear-teeth part and the dome part are formed with heat-resistant resin, sterilization by boiling becomes possible and it becomes the thing outstanding for reasons of sanitation. moreover -- biting, since the gear-teeth part is formed of the elasticity styrene system elastomer -- condition -- gear teeth -- ** -- ***** -- it will become suitable.

[0019]since the housed article which becomes movable inside is provided in the inside of a dome part, it is a toy when a housed article contacts a hard dome part -- a sound comes out so that it may be almost empty. with this, a designing thing is provided as a housed article -- visual and auditorily pleasant gear teeth -- ** -- it becomes. the gear teeth which become like a self-righting dharma doll and the high small child of the age of the moon can also enjoy by having formed the slide plate which becomes slidable over the peripheral surface of a dome part especially at a designing thing -- ** -- it becomes.

[0020]By carrying out ultrasonic welding, it can paste up without using drugs, such as adhesives and a solvent, and excels in a safety aspect and a sanitary aspect.

[0021]

[Example]

(1) the gear teeth by below the main examples and this invention -- ** -- describe one example based on a drawing. drawing 1 -- the gear teeth of the star of this example -- ** -- it is shown and (a) is an important section side sectional view in which a top view and (b) show a side view, drawing 2 shows the sectional view of each petal portion of drawing 1, and drawing 3 shows engagement in the welded section of a dome part, and a dome part and a gear-teeth part.

[0022]It has the dome part 1 at the center, the petal-like gear-teeth part 2 is formed in the circumference, and the slight gear-tooth hard of this example is fabricated by the star at the whole.

[0023]The dome part 1 comprises the dome state member 1a of the upper surface and the undersurface, and is formed of polycarbonate which is rigid resin with transparent each. And the edge part of both the dome state member is engaged, and the hollow dome part 1 is formed. As such a dome state member 1a is shown in drawing 3, the 1st leg 6 is formed in each edge part at approximately L type. Also near [the] the inside, the 2nd leg 7 is formed in ring shape in parallel with the 1st leg 6, and between biped parts is formed as the ring shaped groove 8. The end face 7a of this 2nd leg 7 is formed stair-like, and the upper part side dome state member and the lower part side dome state member can be engaged mutually. the stair-like end face 7a of the 2nd leg 7 is engaged -- while -- **** -- the projection 11 for welding is projected and formed in ring shape.

[0024]On the other hand, as for the gear-teeth part 2, six petals are fabricated by one. This gear-teeth part 2 is formed with resin with the molecular structure of styrene ethylene butylene styrene (S-EB-S) which is a styrene system elastomer as resin which has elasticity. Three pairs of petals 2a, 2b, and 2c are provided, and this gear-teeth part 2 serves as the shape of surface type different, respectively, if the petal which counters is made into a couple. That is, the rail-like projected part 3 projected in the shape of [two] a rail is formed in the petal center section at the petal 2a shown in (a) of drawing 3. This projected part 3 is formed in parallel with two of the petal which counters. Petal 2b shown in drawing 3 (b) is formed as the projected part 4 which the periphery of the petal projected. Two or more hemispherical projected parts 5 which projected the petal 2c shown in drawing 3 (c) hemispherical near the outer edge section of a petal are formed.

[0025]Such an internal circumference edge portion of the gear-teeth part 2 is formed so that it may engage with the edge part of said dome part 1. That is, the ring shape engaging projection 9 which engages with the ring shaped groove 8 of said dome part, and the ring shape engagement groove 10 which engages with the 1st leg 6 are formed in the upper surface and the undersurface at the internal circumference edge portion of the gear-teeth part 2.

[0026]The dome part 1 and the gear-teeth part 2 which were formed in this way are engaged as follows. That is, the end face of the 2nd leg that is an engagement part of the up-and-down dome state member 1a is mutually pasted up by ultrasonic welding. At the time of the ultrasonic welding of the up-and-down dome state member 1a, when said projection 11 for welding fuses, an engagement part will paste this up. Can come, the ring shape engaging projection 9 is made to engage with the ring shaped groove 8 of the dome part 1, and also the 1st leg 6 and the ring shape engagement groove 10 are made engaged. By this, when the up-and-down dome state member 1a pastes up, the dome part 1 will pinch the gear-teeth part 2.

[0027]That by which it was checked that the resin used for the dome part 1 and the gear-teeth part 2 is harmless for reasons of sanitation is used.

[0028]By the way, a housed article smaller than dome part 1 inside is provided in the inside of the dome part 1 movable, and is in it. This housed article gets interested for infants, such as appearance things of animation, such as a ball, a flower, a star, snow, garden stuff, an animal, fish and shellfishes, and a vehicle, and is formed in lovely shape with which it is pleased. In such a housed article, one piece or two pieces or more are provided for one kind or two kinds of things.

[0029]There are some which provided the one main housed articles as shown in drawing 4, and corpuscle-like things (not shown), such as two or more balls, as an example of such a housed

article. The designing thing 12 which comprised the plate-like part 13 and the curved slide plate 14 formed in the edge as main housed articles is formed in dome part 1 inside. The plate-like part 13 is formed so that it may become tabular to the gear-teeth part 2 and a uniform direction. The pictures 13a, such as an animal, are drawn on the tabular plane of the rear surface. And the slide plate 14 is formed in the edge by the side of the lower part of the picture of the plate-like part 13. The slide plate 14 is constituted so that it may become slidable about the periphery of ring shape constituted by the 2nd leg 7 in the dome part 1.

[0030](2) the operation effect of an example -- the gear teeth of this example constituted as mentioned above -- ** -- a operation effect is as follows. That is, the gear-teeth part 2 is arranged, the dome part 1 and the gear-teeth part 2 paste the dome part 1 circumference in which the housed article was stored inside by ultrasonic welding, and the slight gear-tooth hard of this example is formed in a star at it. In such this example, familiarity is memorized like a toy for infants by the whole shape and dome part 1 inside.

[0031]About the dome part 1, since polycarbonate of rigid resin is used and the housed article is provided in the inside movable, the following effects will be acquired. That is, since the slight gear-tooth hard of this example has the transparent dome part 1, it can see the housed article of dome part 1 inside, and lengthens infants' interest visually. the picture 13a liked by infants is especially drawn on the designing thing 12 of a housed article -- gear teeth -- ** -- since it moves along the internal circumference edge of a dome part when shaken, the effect as a toy can be acquired. since the slidable slide plate 14 is formed in the designing thing 12 along with the 2nd leg of a dome part -- gear teeth -- ** -- when it stands vertically, it will be in the state which always stood as for the picture 13a, i.e., the state where top and bottom suited. this becomes like a self-righting dharma doll -- gear teeth -- ** -- it does not get bored like a toy for the infants who use it. since corpuscle-like things other than the designing thing 12, such as a ball, are provided as a housed article -- gear teeth -- ** -- when shaken, a corpuscle-like thing will contact the hard dome part 1, and there will be a sound in it. This demonstrates the same effect and becomes almost empty [a toy] with a pleasant thing for the suckling of the low age of the moon especially. this corpuscle-like thing -- gear teeth -- ** -- when it stands, it acts by riding on the slide plate 14 also as weight in the designing thing serves as a self-righting dharma doll.

[0032]And since the dome part 1 and the gear-teeth part 2 are fabricated with heat-resistant material, both the slight gear-tooth hard of this example can be sterilized by boiling. Like [since a slight gear-tooth hard is what infants put into a mouth, its disinfection is indispensable, and] conventional technology, compared with disinfection by medicine for disinfection, such as ethanol, sterilization by boiling does not have survival of medicine, and can be disinfected to detail. the gear teeth which were excellent in the safety aspect and the sanitary aspect by this -- ** -- it can carry out.

[0033]Since the dome part 1 has pasted up by ultrasonic welding especially, waterdrop does not invade into dome part 1 inside at the time of sterilization by boiling. Since the edge part of a dome part is formed stair-like so that engagement is possible, and each stairway portion is well sealed, sterilizing by boiling frequently by providing the prevention from invasion of waterdrop in the fold -- ** -- it does not happen that waterdrop invades into the inside of a dome -- gear teeth -- ** -- ***** -- it can be used in the state where it was stabilized for a long period of time. When the dome part 1 fabricates a dome state member by adhesion, in order to pinch a gear-teeth part, the dome part 1 and the gear-teeth part 2 will be engaged certainly.

[0034]thus, the ** which does not use drugs, such as adhesives and a solvent, since the dome part 1 is pasted up by ultrasonic welding and the dome part 1 and the gear-teeth part 2 are engaged -- gear teeth -- ** -- it can fabricate. Therefore, also at the time of the use as a slight gear-tooth hard, since elution of drugs, such as adhesives, does not take place at the time of sterilization by boiling, either, safety is high.

[0035]since the gear-teeth part 2 is fabricated in this example by the styrene system elastomer --

gear teeth -- ** -- ***** -- it has sufficient softness and elasticity. Since ejection or extrusion shaping is possible for a styrene system elastomer, it can form in the surface various kinds of shape, such as the shape of a rail and a hemispherical projected part, and a projected part that the periphery projected. Thereby, it can be used as a slight gear-tooth hard, without [which was varied] biting, becoming condition and infants getting bored. In particular, in this example, since three kinds of shape are formed in the petal part, it bites by the portion to bite and condition differs, and even if infants use it over a long period of time, it does not get bored.

[0036]as mentioned above, the gear teeth of this example -- ** -- the gear teeth where bit and condition became the optimal and which were excellent in the safety aspect and the sanitary aspect for infants -- ** -- gear teeth -- ** -- also visually and auditorily, he can enjoy himself in toy for the infants of the broad age of the moon to need. long term use will be carried out by this, without getting bored -- gear teeth -- ** -- ***** -- an effect can fully be acquired.

[0037]The slight gear-tooth hard of this example can also be disinfected with medicine for disinfection, such as ethanol besides sterilization by boiling. this -- outdoors -- gear teeth -- ** -- it can fully disinfect also by wiping with soft paper, cloth, etc. which medicine for disinfection, such as ethanol, was made to permeate by dropping in the road etc. when disinfection was required. However, when medicine for disinfection, such as ethanol, is used, it shall be after checking having dried thoroughly that infants use it.

[0038](3) Other example this inventions are not limited to the example mentioned above, and the engagement method of concrete shape or the dome part 1, and the gear-teeth part 2 can be changed suitably. an example -- a star's gear teeth -- ** -- although carried out, it can be considered as the shape with which infants are pleased besides this shape. For example, as shown in drawing 5, it can be considered as the shape of a cherry and can also be considered as the shape of the apple shown in drawing 6. It is possible to consider it as the lovely shape which gets interested for infants, such as appearance things of animation, such as a star, snow, garden stuff, an animal, fish and shellfishes, and a vehicle, and has a dream with which it is pleased.

[0039]It is possible as a housed article of dome part 1 inside to form the slide plate 14 in the upper part of the plate-like part 13 by the side of opposite about the designing thing 12 as shown in drawing 4 of an example. Thereby, it is lost that the upper part of the plate-like part 13 bites. In this case, weight etc. are formed so that the lower part side may become heavy compared with the upper part side of the plate-like part 13. It thereby always becomes like a self-righting china doll. A slide plate is formed in a ring shape board, and plate-like parts, such as a disk and cross shape, are provided in this inside. The ball state thing which becomes movable to a dome part is provided. It is also possible to draw what has dreams, such as the flower which is the target of interest for infants, a star, snow, garden stuff, an animal, fish and shellfishes, a vehicle, an appearance thing of animation, or a rainbow, in such a plate-like part of a housed article and the surface of a ball state thing on 1 or or more 2 surface. It is possible for it not to be limited to drawing but to stick the designed sticker etc.

[0040]It is not limited to drawing on a plate-like part, but a designing thing can also be considered as a thing like a stuffed animal. It is also possible to provide a small ring as other housed articles, to make the parts of the arm of design *****, etc. project to the upper part or the side, and constitute like quoits. It is also possible to constitute so that the housed article itself may generate a sound like a bell, and there will be two or more kinds of sounds, and it will become pleasant like a toy for infants.

[0041]as mentioned above, vision and a housed article with which infants get interested auditorily and it is pleased -- gear teeth -- ** -- ***** -- it can be used without getting bored and the effect can fully be acquired.

[0042]By the way, it is not limited to the molecular structure of styrene ethylene butylene styrene (S-EB-S), but the styrene system elastomer used as a slight gear-tooth hard of this invention can also use the thing of the molecular structure of styrene butadiene styrene (S-B-S). It is also

possible to use a mixing [with the thermoplastics of the olefin system] thing. It is also possible to mix a harmless bulking agent and a hardening agent if needed for reasons of sanitation, and to change hardness suitably. Thereby for example, in the case of an above-mentioned example, hardness is also changeable for every one petal portion or every couple, it can bite so much, change can be given to condition, and both the sucklings for three months and the small children for 18 months can use it broadly.

[0043]It is also possible to mix a harmless color pigment in such a styrene system elastomer if needed for reasons of sanitation. By mixing a color pigment, it can color suitably according to the color inside the shape and dome. gear teeth pleasant for infants by this -- ** -- it can come out.

[0044]On the other hand, as rigid resin, the dome part which the gear tooth of this invention accumulates is not limited to polycarbonate, but has heat resistance, and can use heat-resistant ABS plastics etc. as harmless transparent resin for reasons of sanitation.

[0045]About the dome state member which constitutes the dome part 1 in an example, the projection 11 for welding of the end face of each 2nd leg cannot be limited to forming in one shape, but can also be provided in two or more places. That is, since each 2nd leg is formed stair-like so that engagement is possible, it can also fully prevent invasion of waterdrop that ultrasonic welding of two or more places is carried out. It is possible to form the dome part 1 also by welding of those other than ultrasonic welding.

[0046]in this invention, color changes with temperature into a dome -- or more than constant temperature (for example, 100 **) -- ***** -- materials, such as paper from which color changes suddenly, can also be paid. Thereby, it can be considered as the temperature at the time of sterilization by boiling, or the rule of thumb of time.

[0047]

[Effect of the Invention]It has the softness and elasticity sufficient [as mentioned above] as a slight gear-tooth hard by this invention for the portion included in infants' mouth, and can bite, and also a dome is provided.

therefore -- excelling in a safety aspect and a sanitary aspect by having an element as a tooth -- for infants -- **** -- the gear teeth which can do things -- ** -- it can provide.

[Translation done.]